generator/motor,] reconfigured to a controlled 60 hertz mode, and then either supplies regulated 60 hertz three phase voltage to a stand alone load or phase locks to the utility, or to other like controllers, to operate as a supplement to the utility. In this mode of operation, the power for the inverter is derived from the permanent magnet generator/motor via high frequency rectifier bridges. The microprocessor monitors turbine conditions and controls fuel flow to the gas turbine combustor.

Please delete all three paragraphs under the heading SUMMARY OF THE INVENTION, and insert the following new text under the heading SUMMARY OF THE INVENTION:

In one aspect of the present invention, a turbine generator system is provided including a turbine engine, a motor/generator rotationally coupled to the turbine engine for generating AC power for a load, and a controller connected to the turbine engine for controlling fuel flow to the turbine engine. The controller includes microprocessor-controlled switched elements for inverting internal DC power to output AC power for the load, and is connected to the motor/generator for applying the output AC power to the motor/generator at varying voltage and varying frequency to adjust the motor/generator speed.

In another aspect of the present invention, the controller is connected to the load for transferring AC power to the load and includes microprocessor-controlled switched elements for applying AC power to the motor/generator at varying voltage and varying frequency to adjust the motor/generator speed.

In yet another aspect of the present invention, the controller is connected to the turbine engine and includes microprocessor-controlled switched elements for applying AC power to the motor/generator to start the turbine engine, and is also connected to the load for supplying output AC power to the load after the turbine engine has started.

The controller may include a pulse width modulated inverter that comprises the microprocessor-controlled switched elements, which may comprise integrated gate bipolar transistors. The inverter may further comprise at least one microprocessor-controlled switched element connected to the motor/generator for providing an artificial neutral pole.

The controller may further include control logic connected to the turbine engine and responsive to a turbine exhaust temperature for controlling fuel flow to the turbine engine. The controller may also include control logic connected to the switched elements to phase lock the output AC power to AC power supplied by at least one other controller.

The controller may further include a DC bus connected to the microprocessor-controlled switched elements for transferring the internal DC power from the motor/generator to the microprocessor-controlled switched elements. The DC bus may also be connected to the motor/generator for receiving internal DC power from the motor/generator, and the microprocessor-controlled switched elements connected to the DC bus for inverting the internal DC power to output AC power for the load.

In another aspect of the present invention, a controller is provided for controlling a motor/generator driven by a turbine engine, the controller comprising a plurality of microprocessor-controlled switched elements connected to the motor/generator for applying power to the motor/generator at varying voltage and varying frequency to adjust the motor/generator speed, and a DC bus for transferring rectified DC power from the motor/generator to an inverter circuit to supply AC power to a load, the DC bus being connected to the microprocessor-controlled switched elements for providing DC power to the microprocessor-controlled switched elements.

In still another aspect of the present invention, a controller is provided for controlling a motor/generator driven by a turbine engine, the controller comprising a DC bus connected to the

motor/generator for receiving rectified DC power from the motor/generator, and a plurality of microprocessor-controlled switched elements connected to the DC bus for inverting DC power received from the DC bus to supply AC power to a load.

In yet another aspect of the present invention, a controller is provided for controlling a motor/generator driven by a turbine engine, the controller comprising a rectifier circuit connected to the motor/generator for rectifying AC power from the motor/generator, and a plurality of microprocessor-controlled switched elements connected to the rectifier circuit for inverting DC power from the rectifier circuit to supply AC power to a load.

In another aspect of the present invention, a controller is provided for controlling a motor/generator driven by a turbine engine, the controller comprising a rectifier circuit connected to the motor/generator for rectifying AC power from the motor/generator, the rectifier circuit being reconfigurable to rectify AC power from a power grid, and an inverter including a plurality of microprocessor-controlled switched elements connected to the rectifier circuit for inverting DC power from the rectifier circuit to supply AC power to the power grid, the inverter being reconfigurable to supply AC power to the motor/generator.

In another aspect of the present invention, a method is provided for controlling a system including a motor/generator rotationally coupled to a turbine engine, the method comprising connecting a controller to the motor/generator for applying power to the motor/generator at varying voltage and varying frequency to adjust the speed of the motor/generator, connecting the controller to the turbine engine to control fuel flow to the turbine engine, operating the controller to apply power to the motor/generator to accelerate the turbine engine to a predetermined speed, initiating combustion in the turbine engine at the predetermined speed, and operating the controller to apply power to the motor/generator to adjust the speed of the motor/generator after initiating combustion in the turbine engine.

Please amend the BRIEF DESCRIPTION OF THE DRAWINGS as follows:

FIG. 1 is a perspective view, partially cut away, of a permanent magnet turbogenerator/motor utilizing [the] a controller [of] in accordance with the present invention;

FIG. 2 is a functional block diagram of the interface between the permanent magnet turbogenerator/motor of FIG. 1 and [the] a controller [of] in accordance with the present invention;

FIG. 3 is a functional block diagram of [the] a permanent magnet turbogenerator/motor controller [of] in accordance with the present invention; and

FIG. 4 is a circuit diagram of [the] a PWM inverter [of the] that may be used with a permanent magnet turbogenerator/motor controller [of] in accordance with the present invention.

Please insert the following two paragraphs immediately after the heading DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS:

The turbogenerator/motor controller of the present invention is a microprocessor based inverter having multiple modes of operation. To start the turbine, the inverter connects to and supplies fixed current, variable voltage, variable frequency, AC power to the permanent magnet turbogenerator/motor, driving the permanent magnet turbogenerator/motor as a motor to accelerate the gas turbine. During this acceleration, spark and fuel are introduced in the correct sequence, and self-sustaining gas turbine operating conditions are reached.

At this point, the inverter is disconnected from the permanent magnet generator/motor, reconfigured to a controlled 60 hertz mode, and then either supplies regulated 60 hertz three phase voltage to a stand alone load or phase locks to the utility, or to other like controllers, to operate as a supplement

to the utility. In this mode of operation, the power for the inverter is derived from the permanent magnet generator/motor via high frequency rectifier bridges. The microprocessor monitors turbine conditions and controls fuel flow to the gas turbine combustor.

Please amend the DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS as follows:

A permanent magnet turbogenerator/motor 10 is illustrated in FIG. 1 as an example of a turbogenerator/motor [utilizing the] that may be utilized with a controller [of] in accordance with the present invention. [The] A permanent magnet turbogenerator/motor 10 generally [comprises] includes a permanent magnet generator 12, a power head 13, a combustor 14 and a recuperator (or heat exchanger) 15.

[The] A permanent magnet generator 12 generally includes a permanent magnet rotor or sleeve 16, having a permanent magnet disposed therein, rotatably supported within a stator 18 by a pair of spaced journal bearings. Radial stator cooling fins 25 are enclosed in an outer cylindrical sleeve 27 to form an annular air flow passage which cools the stator 18 and thereby preheats the air passing through on its way to the power head 13.

The power head 13 of the permanent magnet turbogenerator/motor 10 will typically include[s] compressor 30, turbine 31, and bearing rotor 36 through which the tie rod 29 passes. The compressor 30, having compressor impeller or wheel 32 which receives preheated air from the annular air flow passage in cylindrical sleeve 27 around the stator 18, is driven by the turbine 31 having turbine wheel 33 which receives heated exhaust gases from the combustor 14 supplied with air from recuperator 15. The compressor wheel 32 and turbine wheel 33 [are] may be rotatably supported by bearing shaft or rotor 36 which may have [having] radially extending bearing rotor thrust disk 37. The bearing rotor 36 [is] may be rotatably supported by a single journal bearing within the center bearing housing while the bearing rotor thrust disk 37 at the compressor end of the bearing rotor 36 [is] may be rotatably

supported by a bilateral thrust bearing. [The] A bearing rotor thrust disk 37 is usually adjacent to the thrust face at the compressor end of the center bearing housing while a bearing thrust plate is typically disposed on the opposite side of the bearing rotor thrust disk 37 relative to the center housing thrust face.

The two IGBTs 74 and 78 in IGBT channel 70 function in the generate mode to form a constant duty fifty percent duty cycle divider to maintain exactly half bus voltage at the center tap at all times. That center tap point forms the neutral for the AC output. The neutral is not required for generator starting but is required for utility interface. The IGBT channels 71, 72, and 73 form a [classic] six transistor PWM inverter.

The reconfiguration or conversion of the PWM inverter 49 to be able to operate as a current source synchronous with the utility grid [is] may be accomplished by first stopping the PWM inverter 49. The AC output or the grid connect point is monitored with a separate set of logic monitoring to bring the PWM inverter 49 up in a synchronized fashion. The generator contactor 53 functions to close and connect only when the PWM inverter 49 needs to power the permanent magnet turbogenerator/motor 10 which is during the start operation and during the cool down operation. The output contactor 52 is only enabled to connect the PWM inverter 49 to the grid once the PWM inverter 49 has synchronized with grid voltage.

The implementation of the control power supply 56 first drops the control power supply 56 down to a 24 volt regulated section to allow an interface with a battery or other control power device. The control power supply 56 provides the [conventional] logic voltages to both the IGBT gate drives 58 and control logic 57. The IGBT gate drives 58 have two isolated low voltage sources to provide power to each of the two individual IGBT drives and the interface to the IGBT transistors is via a commercially packaged chip.

In the Claims: